

REMARKS

As a preliminary matter, Applicants thank the Examiner for the courtesy shown in the series of telephone interviews conducted between Applicants' representative Josh C. Snider, and the Examiner, which concluded on April 14, 2004. Claim 1 of the present invention was discussed, and in relation to the Nishi reference (U.S. 5,541,747). Agreement as to the patentability of claim 1 was not reached.

Claim 1 stands rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. Specifically, the Examiner asserts that the phrase in claim 1 reciting that "the relative dielectric constant being not affected by the spontaneous polarization" is not supported by the Specification to the present Application. Applicants respectfully traverse as follows.

Applicants acknowledge that the Examiner's statement on page 3 of Paper No. 20040422 is correct, that the relative dielectric constant ϵ/ϵ_0 of a material is *generally* a function of spontaneous polarization, as represented by Nishi's equation (3). According to Nishi, this relative dielectric constant is equal to the sum of ϵ_r plus the product of $a*P$, where a is a constant and P the value regarding the spontaneous polarization. Nishi recognizes that ϵ_r , however, is "not associated with the spontaneous polarization." (Col. 17, lines 9-10). In other words, when the product $a*P$ has a value of zero, the relative dielectric constant will not be affected by the spontaneous polarization. Such is the case presented by the present invention.

Claim 1 of the present invention has therefore been amended to clarify that, as should be known by those skilled in the art, the period when the switching element is turned on is a relatively short period in which the spontaneous polarization barely responds. In other words, the short period when the switching element is turned on would provide a zero value to the product a^*P , and therefore the relative dielectric constant will be equal to ϵ_r , which is not affected by the spontaneous polarization. For the purposes of this discussion, Applicants only submit that these values and relationships hold true for the relatively short period recited in claim 1, when the switching element is turned on. For at least these reasons therefore, Applicants submit that the Section 112 rejection has been sufficiently traversed.

Claims 1, 5, 9, and 13 stand rejected under 35 U.S.C. 102(b) as being anticipated by Nishi. Applicants respectfully traverse this rejection for at least the reasons discussed above, previously, and as follows. Nishi fails to teach (or suggest) a value for the relative dielectric constant of 3 or greater when the relative dielectric constant (ϵ_r) is not affected by spontaneous polarization, as in claim 1 of the present invention, as amended.

As explained above, for the claimed period when the switching element is turned on and the relative dielectric constant is substantially equal to ϵ_r , the present invention features that the value for this relative dielectric constant during this period is not less than 3. Applicants submit that, because Nishi does not teach or suggest any such values for the term ϵ_r , the Section 102 rejection of claim 1 (and its dependent claims 5, 9, and 13) based on Nishi is respectfully traversed.

Applicants further traverse the rejection because Nishi does not distinguish between a maximum quantity of charge injected into the liquid crystal display, and a charge smaller than the maximum quantity. Applicants submit that one skilled in the art should know that the “maximum quantity of charge” into a display device is the maximum driving voltage which any particular display design will permit. When this maximum quantity of charge is applied to the liquid crystal display, Applicants further submit that a maximum response of spontaneous polarization will be obtained, as well as the greatest value obtainable for light transmittance from the liquid crystal display. It then follows that a charge smaller than the maximum quantity would result in a smaller response of spontaneous polarization, as well as an intermediate level of light transmittance, namely, half tone displays. One skilled in the art should be aware of these relationships, as it is known that spontaneous polarization tends to be an invariable value inherent to the material used in the display, whereas the quantity of charge injected into the display is variable.

Accordingly, the present invention sets the value for the relative dielectric constant (equal to ϵ_r for the claimed period) to be not less than 3, when the maximum quantity of charge, discussed above, is injected into the display. Applicants submit that Nishi neither teaches nor suggests any such additional features as well. Nishi is silent regarding the maximum quantity of charge and the relative dielectric constant when it is substantially equal to ϵ_r . Accordingly, for at least these further reasons, the Section 102 rejection based on Nishi is respectfully traversed.

Claims 3-4, 7-8, 11-12, and 15-16 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Nishi in view of Ishii et al. (U.S. 5,642,214). Applicants respectfully traverse this rejection for at least the reasons discussed above with respect to claim 1. All of these claims rejected under Section 103 depend either directly or indirectly from independent claim 1, and therefore include all of the features of the base claim, plus additional features. Applicants further traverse as follows.

As discussed above, and as explained in the Specification to the present Application, the period when the switching element is turned on is a relatively short period which corresponds to the description of the experiment showing that the holding rate is coincident with the equation $(Q-2Ps)/Q$ at the time of applying a driving voltage. In other words, the quantity of charge injected into the liquid crystal display element while the FET is maintained ON is consumed by the inversion of the spontaneous polarization to a quantity corresponding to $2Ps$ while the FET is maintained OFF. Therefore, according to the present invention, for the claimed period, the holding rate and the value $(Q-2Ps)/Q$ are virtually coincident with one another, and one skilled in the art should easily understand that spontaneous polarization will barely respond when the switching element is turned ON. For at least these reasons, Applicants submit that that it would not be obvious to derive these specific relationships, for these specific time periods and events, from the teachings of either Nishi or Ishii, alone or in combination. The Section 103 rejection based on these two references is therefore further traversed.

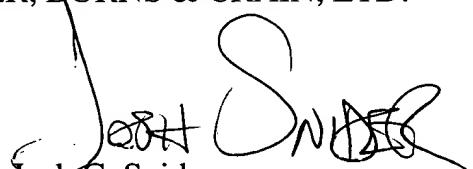
New claim 17 has been added to recite another combination of features of the present invention, and is supported by the Specification to the present Application, as well as the discussions above. Entry, consideration on the merits, and allowance of new claim 17 are therefore respectfully requested.

For all of the foregoing reasons, Applicants submit that this Application, including claims 1, 3-5, 7-9, 11-13, and 15-17, is in condition for allowance, which is respectfully requested. The Examiner is invited to contact the undersigned attorney if a further interview would expedite prosecution.

Respectfully submitted

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